

What is claimed is:

- 1 1. An apparatus for managing storage access, comprising:
2 a disk system, comprising:
3 at least one of a plurality of logical device storage units;
4 at least one of a plurality of interface ports; and
5 a control unit, connected to, and operable to control input and
6 output to and from said at least one of a plurality of logical device storage units through
7 said at least one of a plurality of interface ports;
8 a disk system manager, operative to manage information storage to,
9 retrieval from, allocation of, and de-allocation of said at least one of a plurality of logical
10 device storage units; and
11 a storage access service system, comprising a memory operative to contain
12 a plurality of user information, said user information including a time based component,
13 said storage access service system operative to grant authorization to access said at least
14 one of a plurality of logical device storage units based upon said user information.
- 1 2. The apparatus of claim 1, wherein said time based component
2 further comprises time zone information, said user information further comprises at least
3 one of a plurality of billing rates corresponding to said time zone information, and
4 wherein said storage access service system determines charges for user access service
5 based upon said time zone information, said at least one of a plurality of billing rates, and
6 an access time for said at least one of a plurality of users.
- 1 3. The apparatus of claim 2, wherein said user information further
2 comprises a history of accesses for said at least one of a plurality of users, and wherein
3 storage access service system determines charges for user access service based upon said
4 history of accesses for said at least one of a plurality of users.
- 1 4. The apparatus of claim 3, wherein said at least one of a plurality of
2 billing rates corresponds to selected ones of a plurality of time periods for each of
3 individual instances of said time zone information, and wherein said storage access
4 service system determines charges for user access service based upon said history of
5 accesses for said at least one of a plurality of users by comparing individual instances
6 selected from said history of accesses to said selected ones of said plurality of time

7 periods to determine applicable billing rates from among said at least one of a plurality of
8 billing rates, and thereupon computing a cost of access by summing a cost for each of
9 said individual instances selected from said history of accesses multiplied by said
10 applicable billing rates.

1 5. The apparatus of claim 4, wherein said at least one of a plurality of
2 billing rates are determined from a service level agreement (SLA).

1 6. The apparatus of claim 2, wherein said at least one of a plurality of
2 billing rates corresponds to selected ones of a plurality of time periods for each of
3 individual instances of said time zone information; and wherein said at least one of a
4 plurality of users agrees to access said at least one of a plurality of logical device storage
5 units at individual instances of said plurality of time periods in accordance with a preset
6 schedule, and wherein said storage access service system determines charges for user
7 access service based upon said at least one of a plurality of billing rates for said plurality
8 of time periods in said preset schedule for said at least one of a plurality of users.

1 7. The apparatus of claim 6, wherein said storage access service
2 system determines charges for user access service for said at least one of a plurality of
3 users by comparing individual instances of said plurality of time periods in accordance
4 with said preset schedule to said selected ones of said plurality of time periods to
5 determine applicable billing rates from among said at least one of a plurality of billing
6 rates, and thereupon computing a cost of access by summing a cost for each of said
7 individual instances of said plurality of time periods in accordance with said preset
8 schedule multiplied by said applicable billing rate.

1 8. The apparatus of claim 7, wherein said at least one of a plurality of
2 billing rates are determined from a service level agreement (SLA).

1 9. The apparatus of claim 6, wherein said storage access service
2 system determines charges for user access service for said at least one of a plurality of
3 users by comparing individual instances of said plurality of time periods in accordance
4 with said preset schedule to said selected ones of said plurality of time periods to
5 determine applicable billing rates from among said plurality of billing rates, and
6 thereupon computing a cost of access by multiplying said applicable billing rate by a

7 number of instances of said plurality of time periods in accordance with said preset
8 schedule in a billing cycle.

1 10. The apparatus of claim 9, wherein said plurality of billing rates are
2 determined from a service level agreement (SLA).

1 11. A method for managing access to storage resources, comprising:
2 forming an agreement between access providers and users, said agreement
3 comprising user information including an identity of a user; an identity of a resource, a
4 time zone, and at least one of a plurality of billing rates for accessing said resource;
5 granting access to said resource based upon said identity of said user, said
6 identity of said resource, and said time zone; and
7 determining charges for accessing said resource based upon said identity
8 of said user, said identity of said resource, and said at least one of a plurality of billing
9 rates.

1 12. The method of claim 11, further comprising:
2 logging individual instances of access to said resource into a history of
3 accesses.

1 13. The method of claim 12, wherein determining charges for a user
2 based upon individual instances of access by said user of said resource, said time zone,
3 and said at least one of a plurality of billing rates comprises:
4 determining a usage time for each individual instance of access selected
5 from said history of accesses;
6 determining a billing rate corresponding to said usage time from among
7 said at least one of a plurality of billing rates; and
8 computing a cost by summing a cost for each individual instance of access
9 selected from said history of accesses, said cost computed by multiplying said usage time
10 by said billing rate corresponding to said usage time.

1 14. The method of claim 13, wherein said at least one of a plurality of
2 billing rates corresponds to at least one of a plurality of time periods for said time zone,
3 and wherein determining a billing rate corresponding to said usage time from among said
4 at least one of a plurality of billing rates comprises:

5 comparing said individual instances of accesses logged into said history of
6 accesses to said plurality of time periods to select a billing rate corresponding to said
7 usage time from among said plurality of billing rates.

1 15. The method of claim 11, wherein said user agrees to access said
2 resource at a time period in accordance with a preset schedule; and wherein said granting
3 access to said resource based upon said identity of said user, said identity of said
4 resource, and said time zone comprises:

5 granting said user access to said resource within said time period in
6 accordance with said preset schedule.

1 16. The method of claim 15, wherein said at least one of a plurality of
2 billing rates for accessing said resource corresponds to at least one of a plurality of time
3 periods for said time zone, and wherein determining charges for accessing said resource
4 based upon said identity of said user, said identity of said resource, said at least one of a
5 plurality of billing rates, and said time period comprises:

6 selecting from among said plurality of billing rates a billing rate
7 corresponding to said time period in accordance with said preset schedule; and

8 computing a cost of access by summing a cost for each individual instance
9 of said time period in accordance with said preset schedule multiplied by said billing rate
10 corresponding to said time period in accordance with said preset schedule.

1 17. The method of claim 15, wherein said at least one of a plurality of
2 billing rates for accessing said resource corresponds to at least one of a plurality of time
3 periods for said time zone, and wherein determining charges for accessing said resource
4 based upon said identity of said user, said identity of said resource, said at least one of a
5 plurality of billing rates, and said time period comprises:

6 selecting from among said plurality of billing rates a billing rate
7 corresponding to said time period in accordance with said preset schedule; and

8 computing a cost of access by multiplying said billing rate corresponding
9 to said time period by a number of instances of said time period occurring in a billing
10 cycle in said preset schedule.

1 18. A method for charging users for storage access in a disk subsystem,
2 said method comprising:

3 determining based upon a time zone of a location of a user at least one of a
4 plurality of permitted access times, and at least one of a plurality of access rates, said
5 access rates corresponding to said permitted access times;

6 contracting with said user to provide storage access based upon a capacity,
7 said at least one of a plurality of permitted access times, and said at least one of a
8 plurality of access rates, said access rates corresponding to said permitted access times;

9 tracking time periods when said user accesses storage in said disk system;

10 determining for said time periods charges to said user for access, said
11 charge based upon said time zone of a location of said user, said at least one of a plurality
12 of permitted access times, and said at least one of a plurality of access rates; and

13 determining a total cost from said charges to said users for access.

1 19. A method for charging users for storage access in a disk subsystem,
2 said method comprising:

3 determining based upon a time zone of a location of a user at least one of a
4 plurality of permitted access times, and at least one of a plurality of access rates, said
5 access rates corresponding to said permitted access times;

6 contracting with said user to provide storage access based upon a capacity,
7 said at least one of a plurality of permitted access times, and said at least one of a
8 plurality of access rates, said access rates corresponding to said permitted access times;

9 determining for said permitted access times, charges to said user for
10 access, said charge based upon said time zone of a location of said user, said at least one
11 of a plurality of permitted access times, and said at least one of a plurality of access rates;
12 and

13 determining a total cost from said charges to said users for access.

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